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III. CLAIM AMENDMENTS

1. (Currently Amended) A method of polarization dependent analyzing an optical signal ~~(6)~~ provided to a DUT ~~(10)~~, comprising the steps of:

using the optical signal ~~(6)~~ as a measurement signal ~~(18)~~ of an interferometer ~~(30)~~,

splitting the optical signal ~~(6)~~ at least into a first signal part ~~(16, 6a)~~ having an initial first polarization and a second signal part ~~(20, 6b)~~ having an initial second polarization,

coding the first signal part ~~(16, 6a)~~ using a first code ~~(17, code 1)~~ and coding the second signal part ~~(20, 6b)~~ using a second code ~~(19, code 2)~~,

providing the coded signal parts ~~(16, 6a, 20, 6b)~~ to the DUT ~~(10)~~,

superimposing ~~detecting~~ a DUT-signal ~~(32, 140)~~ coming from the DUT ~~(10)~~ in response to the coded signal parts ~~(16, 6a, 20, 6b)~~ with a reference signal ~~(34)~~ of the interferometer ~~(30)~~ to provide a resulting superimposed signal ~~(36)~~, and

detecting the resulting superimposed signal ~~(36) a DUT-signal (32, 140) coming from the DUT (10) in response to the coded signal parts (16, 6a, 20, 6b)~~, and

determining a first part ~~(a, c)~~ of the DUT-signal ~~(32)~~ corresponding to the first signal part ~~(16, 6a)~~ by means of the first code ~~(17, code 1)~~ and determining a second part ~~(b, d)~~ of the DUT-signal ~~(32, 140)~~ corresponding to the second signal part ~~(20, 6b)~~ by means of the second code ~~(19, code 2)~~.

2. (Currently Amended) The method of claim 1, further comprising the steps of:

additionally splitting the optical signal ~~(6)~~ into a third signal part ~~(6c)~~ having an initial third polarization and a fourth signal part ~~(6d)~~ having an initial fourth polarization,

coding the third signal part ~~(6c)~~ using a third code ~~(code 3)~~ and coding the fourth signal part ~~(6d)~~ using a fourth code ~~(code 4)~~,

providing the first ~~(16, 6a)~~, the second ~~(20, 6b)~~, the third ~~(6c)~~ and the fourth coded signal parts ~~(6d)~~ to the DUT ~~(10)~~,

detecting a DUT signal ~~(32, 140)~~ coming from the DUT ~~(10)~~ in response to the coded signal parts ~~(16, 6a, 20, 6b, 6c, 6d))~~ and

determining a first part ~~(a, c)~~ of the DUT-signal ~~(32, 140)~~ corresponding to the first signal part ~~(16, 6a)~~ by means of the first code ~~(17, code 1)~~ and determining a second part ~~(b, d)~~ of the DUT-signal ~~(32, 140)~~ corresponding to the second signal ~~(20, 6b)~~ by means of the second code ~~(19, code 2)~~ and determining a third part ~~(c)~~ of the DUT-signal ~~(32, 140)~~ corresponding to the third signal part ~~(6c)~~ by means of the third code ~~(code 3)~~ and determining a fourth part ~~(d)~~ of the DUT-signal ~~(32, 140)~~ corresponding to the fourth signal part ~~(6d)~~ by means of the fourth code ~~(code 4)~~.

3. (Currently Amended) The method of claim 1 ~~or any one of the above claims~~, comprising at least one of the features:

the step of ~~wherein~~ coding ~~comprises~~includes at least one of a group comprising:

any manipulation of the signal parts ~~(16, 6a, 20, 6b, 6c, 6d)~~ to unambiguously identify each signal part ~~(16, 6a, 20, 6b, 6c, 6d)~~,

intensity modulating at least one of the signal parts ~~(16, 6a, 20, 6b, 6c, 6d)~~,

using a binary code for at least one of the signal parts ~~(16, 6a, 20, 6b, 6c, 6d)~~;

at least one of the applied first, second, third, and forth polarizations is orthogonal with respect to each of the other polarizations;

at least one of the applied codes is orthogonal with respect to each of the other codes;

the step of determining the parts of the DUT-signal comprises a step of multiplying the DUT-signal with each code.

4.-7. (Cancelled)

8. (Currently Amended) The method of claim ~~7 or any one of the above claims~~ 1, further comprising the steps of:

splitting the resulting superimposed signal ~~(36)~~ into two, preferably orthogonal, parts ~~(40, 42)~~ and detecting each part ~~(40, 42)~~ separately.

9. (Currently Amended) The method of claim ~~7 or any one of the above claims~~ 1, further comprising the steps of:

providing the reference signal ~~(34)~~ with a delay ~~(••)~~ and with a reference code ~~(ref)~~, and

identifying the reference signal ~~(34)~~ by multiplying the reference signal ~~(34)~~ with the reference code ~~(ref)~~.

10. (Currently Amended) The method of claim 9, wherein the reference code ~~(code ref)~~ fulfils the following conditions: the product of the reference code ~~(ref)~~ with the first code ~~(17, code 1)~~ is orthogonal with the product of the reference code ~~(code ref)~~ with the second code ~~(17, code 2)~~, the first code ~~(17, code 1)~~ and the reference code ~~(code ref)~~ are non-orthogonal and the second code ~~(17, code 2)~~ and the reference code ~~(code ref)~~ are non-orthogonal, and

11. (Currently Amended) An apparatus for polarization dependent analyzing an optical signal ~~(6)~~ transmitted through a DUT ~~(10)~~, comprising:

a first coupler ~~(5)~~ adapted for providing a first part of the optical signal ~~(6)~~ to a measurement arm ~~(8)~~ of an interferometer ~~(30)~~, and for providing a second part of the optical signal ~~(6)~~ as a reference signal ~~(34)~~ to a reference arm ~~(12)~~, and

a first beam splitter ~~(14, 105)~~ adapted splitting the first part of the optical signal ~~(6)~~ into a first signal part ~~(16, 6a)~~ having an initial first polarization and a second signal part ~~(20, 6b)~~ having an initial second polarization,

a first modulator ~~(27)~~ adapted coding the first signal part ~~(16, 6a)~~ using a first code ~~(17, code 1)~~,

a second modulator ~~(29)~~ adapted coding the second signal part ~~(20, 6b)~~ using a second code ~~(17, code 2)~~,

a coupler ~~(35, 135)~~ connected to the modulators ~~(27, 29)~~ adapted for reuniting both coded signal parts ~~(16, 6a, 20, 6b, 6c, 6d)~~ and providing both coded signal parts ~~(16, 6a, 20, 6b, 6c, 6d)~~ to the DUT ~~(10)~~,

a second coupler ~~(35)~~ adapted for superimposing a DUT-signal ~~(32)~~ coming from the DUT ~~(10)~~ in response to the coded signal parts ~~(16, 6a, 20, 6b, 6c, 6d)~~ with the reference signal ~~(34)~~ of the interferometer ~~(30)~~ to provide a resulting superimposed signal ~~(36)~~ to the detector ~~(44, 46)~~.

a detector ~~(44, 46)~~ adapted for detecting the resulting superimposed signal ~~(36)a DUT-signal (32, 140) coming from the DUT (10) in response to the coded signal parts (16, 6a, 20, 6b, 6c, 6d)~~,

a first correlator ~~(52-1, 52-3)~~ adapted for determining a first signal part ~~(a, c)~~ of the DUT-signal ~~(32, 140)~~ corresponding to the first signal part ~~(16, 6a)~~ by means of the first code ~~(17, code 1)~~, and

a second correlator ~~(52-2, 52-4)~~ adapted for determining a second part ~~(b, d)~~ of the DUT-signal ~~(32, 140)~~ corresponding to the second signal part ~~(20, 6b)~~ by means of the second code ~~(17, code 2)~~.

12. (Currently Amended) The apparatus of claim 11,

wherein the first beam splitter ~~(14, 105)~~ is designed to additionally split the optical signal ~~(6)~~ into a third signal part ~~(6c)~~ having an initial third polarization and a fourth signal part ~~(6d)~~ having an initial fourth polarization,

and further comprising:

a third modulator ~~(127)~~ adapted for coding the third signal part ~~(6c)~~ using a third code ~~(code 3)~~,

a fourth modulator ~~(129)~~ adapted for coding the fourth signal part ~~(6d)~~ using a fourth code ~~(code 4)~~,

wherein the coupler ~~(35, 135)~~ is additionally connected to the third ~~(127)~~ and the fourth modulator ~~(129)~~ and is designed to reunite the coded signal parts ~~(16, 6a, 20, 6b, 6c, 6d)~~ and to provide the first ~~(16, 6a)~~, the second ~~(20, 6b)~~, the third ~~(6c)~~ and the fourth coded signal parts ~~(6d)~~ to the DUT ~~(10)~~,

a third correlator ~~(52-3)~~ adapted for determining a third signal part ~~(c)~~ of the DUT-signal ~~(32, 140)~~ corresponding to the third signal part ~~(6c)~~ by means of the third code ~~(code 3)~~, and

a fourth correlator ~~(52-4)~~ adapted for determining a fourth part ~~(d)~~ of the DUT-signal ~~(32, 140)~~ corresponding to the fourth signal part ~~(6d)~~ by means of the fourth code ~~(code 4)~~.

13. (Currently Amended) The apparatus of claim 11 ~~or any one of the above claims~~, comprising at least one of the features:

~~wherein~~ coding comprises any manipulation of the signal parts ~~(16, 6a, 20, 6b, 6c, 6d)~~ to unambiguously identify each signal part ~~(16, 6a, 20, 6b, 6c, 6d)~~;~~.~~

at least one of the applied first, second, third, and forth polarizations is orthogonal with respect to each of the other polarizations;

at least one of the applied codes is orthogonal with respect to each of the other codes;

at least one of the modulators is adapted to at least one of the following group including:

intensity modulating at least one of the signal parts to code the signal parts,

using a binary code for at least one of the signal parts to code the signal parts;

at least one of the correlators is adapted to determine the parts of the DUT-signal by multiplying the DUT-signal with each code.

14.-18. (Cancelled)

19. (Currently Amended) The apparatus of claim 11, further comprising:

a second beam splitter ~~(38)~~ adapted ~~for~~ for splitting the resulting superimposed signal ~~(36)~~ into two, preferably orthogonal, parts ~~(40, 42)~~, and

a second detector ~~(44)~~ adapted ~~to be able~~ to detect each part ~~(40, 42)~~ separately.

20. (Currently Amended) The apparatus of claim 11 ~~or any one of the above claims~~, further comprising:

a delay line ~~(60)~~ in the reference arm ~~(12)~~ adapted for providing the reference signal ~~(34)~~ with a delay ~~(••)~~ and with a reference code ~~(code ref)~~, and

a fifth correlator ~~(70)~~ adapted for identifying the reference signal ~~(34)~~ by multiplying the reference signal ~~(34)~~ with the reference code ~~(code ref)~~.

21. (Currently Amended) The apparatus of claim 11 ~~or any one of the above claims~~, further comprising:

a fifth modulator ~~(62)~~ ~~prepared~~ adapted to apply the reference code ~~(code ref)~~ to the reference signal ~~(34)~~ which fulfills the following conditions: the product of the reference code ~~(code ref)~~ with the first code ~~(17, code 1)~~ is orthogonal with the product of the reference code ~~(code ref)~~ with the second code ~~(17, code 2)~~, the first code ~~(17, code 1)~~ and the reference code ~~(code ref)~~ are non-orthogonal and the second code ~~(17, code 2)~~ and the reference code ~~(code ref)~~ are non-orthogonal.